

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-17 (cancelled)

18. (new) A device that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, said device comprising: a) a flexible, sterile tube containing culture medium,

b) a system of clamps, each capable of open and closed positions, the clamps being positioned so as to be able to divide the tube into separate regions containing spent culture (downstream region), growing culture (growth chamber), and fresh growth medium (upstream region),

c) a means of moving the clamps and the tubing such that a portion of the growth chamber and the associated culture can be clamped off and separated from the growth chamber, and such that a portion of fresh tubing containing unused medium can be joined with a portion of the culture and associated medium already present in the growth chamber, wherein each of the clamps does not move with respect to the tube when said clamp is in the closed position.

19. (new) The device according to claim 18, wherein the tubing is flexible to allow clamping and segregation into separated chambers.

20. (new) The device according to claim 18, wherein the tubing is gas permeable, for example comprised primarily of silicon, to

allow gas exchange between the cultured organism and the outside environment, according to the type of experiment.

21. (new) The device according to claim 18, wherein the tubing is gas impermeable, to prevent gas exchange between the tubing and the outside environment, if the experiment demands anaerobiosis.

22. (new) The device according to claim 18, wherein the tubing is transparent or translucent, to allow the measurement of turbidity.

23. (new) The device according to claim 18, wherein the growth chamber tubing and associated media and culture can be depressurized or over pressurized relative to ambient atmosphere as necessitated by experimental requirements.

24. (new) The device according to claim 18, wherein the tubing allows the measure of pH of medium by inclusion of a pH indicator in the tubing composition or lining.

25. (new) The device according to claim 18, wherein the growth chamber tubing and associated media and culture can be heated or cooled as appropriate for experiment conditions.

26. (new) The device according to claim 18, wherein the growth chamber tubing and associated media and culture can be kept motionless or agitated by any already known method.

27. (new) The device according to claim 26 wherein the tubing can include one or several stirring bars for agitation purpose.

28. (new) The device according to claim 18 wherein regions of the tubing can be confined in a specific and controlled atmospheric area to control gas exchange dynamics.

29. (new) The device according to claim 18 wherein the growth chamber tubing and associated media and culture can be tilted either downward to remove aggregated cells, or upward to remove air through the functions described in claim 1-c.

30. (new) A method that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, comprising: a) providing an initial culture in the described growth chamber through sterile injection of a starter culture into a sterile tube containing sterile growth medium; b) maintaining growth conditions according to experimental requisites ; c) after a certain period of time and associated growth of the culture, adjusting the position of the described gates so as to move equal portions of fresh medium and of grown culture (respectively) into and out of the region defined as the growth chamber, allowing the remaining portion of grown culture to mix with the introduced portion of fresh medium and continue to grow; d) reproducing steps b) and c) until the end of experiment to achieve continuous culture and selection of variants with increased reproductive rates; e) withdrawing on demand a sample of grown culture from sampling chamber.

31. (new) A method according to claim 30 wherein applying a simultaneous peristaltic movement of the gates, the tubing, and the medium and culture within the tubing, allows provision of a certain quantity of fresh medium to the growth chamber while an equal quantity of culture is isolated and removed through the

other extremity of said growth chamber, terminating a growth cycle and starting a new one.

32. (new) A method according to claim 30 wherein an experiment can include as many growth cycles as required by the experimenter without possible contamination of isolated growing chamber and without possible proliferation of a dilution-resistant population.

33. (new) A method according to claim 30 such that during the operations the experimenter can maintain growth conditions according to experimental requisites which may include temperature, pressure, optical density, chemical acidity, agitation and aeration with various gases.

34. (new) A method according to claim 30 wherein a combination of tilting the device and operating agitators leads to an appropriate agitation for mixing the growing culture in order to prevent or repress aggregation of living organisms.

35. (new) A device that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, said device comprising:

a continuous length of flexible, sterile tubing;  
a system of clamps positioned at points along a section of the tubing, each of the clamps being positioned and arranged so as to be able to controllably pinch the tubing by putting said clamp into a closed position in which the tubing is divided into separate regions on respective sides of said clamp, the separate regions on respective sides of said clamp being merged back into a single region when said clamp is returned to an open position;

wherein the clamps and tubing are arranged so that the tubing is clamped at first through fourth points along the tubing, defining first through third regions downstream of the first through third points, respectively; and

wherein a volume of the second region delimited by said points two and three is greater than a volume of the first and third regions.

wherein the system of clamps is constructed so that, in a repeating pattern, the tubing is clamped upstream of the first point, the tubing is clamped at a point between the second and third points, and the second point is returned to the open position, thereby subdividing the second region into an upstream portion and a downstream portion, merging the first region and the upstream portion, and thereby defining new first through fourth points and first through third regions.

36. (new) The device according to claim 35, wherein the tubing is gas permeable.

37. (new) The device according to claim 35, wherein the tubing is gas impermeable.

38. (new) The device according to claim 35, wherein the tubing is translucent.

39. (new) The device according to claim 35, wherein the tubing is transparent.

40. (new) The device according to claim 35, wherein contents of the tubing in the second region can be controllably depressurized or over pressurized relative to ambient atmosphere.

41. (new) The device according to claim 35, further comprising a pH indicator in the tubing.

42. (new) The device according to claim 35, further comprising a heating and cooling device that can control a temperature of contents of the tubing.

43. (new) The device according to claim 35, further comprising an agitator.

44. (new) The device according to claim 43, wherein the agitator comprises at least one stirring bar.

45. (new) The device according to claim 35, wherein regions of the tubing can be confined in a specific and controlled atmospheric area to control gas exchange dynamics.

46. (new) The device according to claim 35, further comprising a device to control tilting of the second portion of the tubing.

47. (new) A method that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, said device comprising steps of:

providing a continuous length of flexible, sterile tubing;  
providing a system of clamps positioned at points along a section of the tubing, each of the clamps being positioned and arranged so as to be able to controllably pinch the tubing by putting said clamp into a closed position in which the tubing is divided into separate regions on respective sides of said clamp, the separate regions on respective sides of said clamp being merged back into a single region when said clamp is returned to an open position;  
placing culture medium in the tubing;  
closing the clamps at first through fourth points along the tubing to define first through third regions downstream of the

first through third points, respectively, wherein the volume of the second region delimited by said points two and three is greater than a volume of the first and third regions; introducing said culturable organism into the second region between the second and third points, and allowing the culture to grow in the culture medium; and repeating a step that comprises clamping the tubing upstream of the first point, clamping the tubing at a point between the second and third points, and returning the second point to the open position, thereby subdividing the second region into an upstream portion and a downstream portion, merging the first region and the upstream portion, and thereby defining new first through fourth points and first through third regions.

48. (new) The method of claim 47, wherein applying a simultaneous peristaltic movement of the clamps, the tubing, and the medium and the culture within the tubing, allows provision of a certain quantity of fresh said medium to the second region of the tubing while an equal quantity of said culture is isolated and removed through an opposite end of said second region, terminating one growth cycle and starting a new growth cycle.

49. (new) The method of claim 47, further comprising a step of controlling a pressure of contents of the tubing in the second region.

50. (new) The method of claim 47, further comprising a step of controlling a temperature of contents of the tubing.

51. (new) The method of claim 47, further comprising a step agitating contents of the tubing.



52. (new) The method of claim 47, further comprising a step of providing a specific and controlled atmospheric area around the tubing to control gas exchange dynamics.

53. (new) The method of claim 47, further comprising a step of controllably tilting of the second portion of the tubing.

54. (new) A device for growing living cells in a continuous manner, comprising:

flexible tubing containing culture medium; and  
a system of clamps, each capable of open and closed positions, the clamps being positioned so as to be able to divide the tubing into:

i) an upstream region containing unused culture medium;

ii) a downstream region containing spent culture medium; and

iii) a growth chamber region for growing said cells disposed between the upstream and downstream regions;

wherein the system of clamps is constructed and arranged to open and close so as to clamp off and define the growth chamber region of the tubing between the upstream and downstream regions of the tubing, and to cyclically redefine the growth chamber region of the tubing so that a first portion of the previously defined growth chamber region becomes a portion of the downstream region of the tubing, and a portion of the previously defined upstream region of the tubing becomes a portion of the growth chamber region of the tubing.

55. (new) The device according to claim 54, wherein the system of clamps is structured and arranged so that each of the clamps does not move with respect to the tubing when said clamp is in the closed position.



56. (new) The device according to claim 54, wherein the tubing is gas permeable

57. (new) The device according to claim 54, wherein the tubing is gas impermeable.

58. (new) The device according to claim 54, wherein the tubing is one of transparent and translucent to permit a turbidity meter to determine the density of the culture.

59. (new) The device according to claim 54, wherein the device further comprises a pressure regulator constructed to change a pressure of the growth chamber portion of the tubing relative to ambient pressure.

60. (new) The device according to claim 54, wherein the tubing comprises a pH indicator.

61. (new) The device according to claim 54, further comprising a temperature regulator constructed to control the temperature of the growth chamber region of the tubing.

62. (new) The device according to claim 54, wherein the device further comprises an agitator constructed to allow agitation of the growth chamber portion of the tubing.

63. (new) The device according to claim 62, wherein the agitator comprises at least one stirring bar.

64. (new) The device according to claim 54, wherein said growth chamber region comprises one or more growth chambers containing culture medium.

65. (new) A method for growing cells in continuous manner, comprising:

a) providing flexible tubing and a system of clamps, each of the clamps being capable of open and closed positions, the clamps being positioned so as to be able to divide the tubing into:

i) an upstream region containing unused culture medium;

ii) a downstream region containing spent culture medium; and

iii) a growth chamber region for growing said cells disposed between the upstream and downstream regions; and

b) closing selected ones of the clamps on the tubing to define the growth chamber region of the tubing between the upstream and downstream regions of the tubing, and introducing viable cells into the growth chamber region;

c) cyclically closing and opening selected ones of the clamps to redefine the growth chamber region of the tubing so that a first portion of the previously defined growth chamber region becomes a portion of the downstream region of the tubing, and a portion of the previously defined upstream region of the tubing becomes a portion of the growth chamber region of the tubing; and

d) repeating step c) until a sufficient amount of cells has been grown.

66. (new) The method according to claim 65, comprising the further step of withdrawing a sample of living cells from said culture medium from said downstream region.

67. (new) The method according to claim 65, further comprising isolating said living cells from said downstream region.

68. (new) The method according to claim 65, wherein the living cells are selected from the group consisting of Yeast, Bacteria, Archae, Eukaryotes, and Viruses.

69. (new) The method according to claim 65, wherein said growth chamber region comprises one or more growth chambers containing culture medium.

70. (new) The method according to claim 65, wherein one or more species of organism are grown in said growth chambers.

71. (new) The method according to claim 65, wherein the sufficient amount of cells of step d) is defined as a pre-determined density level of the cells.

72. (new) The method according to claim 65, wherein the tubing is gas permeable

73. (new) The method according to claim 65, wherein the tubing is gas impermeable.

74. (new) The method according to claim 71, wherein the tubing is one of transparent and translucent, turbidimeter being used to determine the density level of the cells.

75. (new) The method according to claim 65, further comprising regulating the pressure of the growth chamber portion of the tubing relative to ambient pressure.

76. (new) The method according to claim 65, further comprising measuring a pH of the culture medium in the growth chamber region.

77. (new) The method according to claim 65, further comprising regulating the temperature of the growth chamber region with a temperature regulator constructed to control the temperature of the growth chamber region of the tubing.

78. (new) The method according to claim 65, further comprising agitating the culture medium in the growth chamber region with an agitator.

79. (new) The method according to claim 78, wherein the agitator comprises at least one stirring bar.